

CLAIMS

What is claimed is:

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1. A rotary flow-through electrodeposition apparatus comprising:

a platen rotatable about a first axis;

an electrolytic cell rotatably mounted upon said platen and rotatable about a second axis, said second axis being offset from and parallel to said first axis; and

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an electrode assembly disposable into said electrolytic cell;

wherein when said platen is rotated and said electrolytic cell is rotated, said electrolytic cell undergoes planetary revolution with respect to said first axis.

2. An apparatus according to claim 1 wherein said electrolytic cell comprises a bowl assembly, said bowl assembly comprising:

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a bowl for containing a substrate material and electrolytic solution;

a plurality of electrodes arranged in a radial array radiating outwardly from said second axis;

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means for serially applying electrical potential sequentially to said electrodes while said electrolytic cell rotates.

3. An apparatus according to claim 2 wherein said plurality of electrodes are electrically isolated in said bowl to have inside faces exposed to the interior of said bowl and contact portions exposed at an undersurface of said bowl, and said means for serially applying electrical potential comprises a wire wheel electrical contact disposed upon said platen in rolling contact with the underside of said bowl and intermittently contactable with said contact portions of said electrodes as said electrolytic cell rotates.

4. An apparatus according to claim 3 wherein said wire wheel contact and said second axis are fixed to be collinear on a common radius of said platen while said platen rotates.

5. An apparatus according to claim 4 wherein the planetary revolution of said electrolytic cell, with respect to said first axis, urges the substrate matter to collect by centrifugal force at the portion of said bowl maximally distanced from said first axis, while the rotation of said electrolytic cell about said second axis causes the substrate material to tumble and agitate at said portion of said bowl.

6. An apparatus according to claim 1 further comprising means for imparting rotary motion, around said second axis, to said electrolytic cell by rotating said platen.

7. An apparatus according to claim 6 wherein said platen is rotatably mounted upon a fixed supporting shaft, and said means for imparting rotary motion comprises:

a drive gear fixed upon said shaft concentrically with said platen;

a planetary gear fixedly mounted upon said bowl and engaged with said drive

gear; and

means for imparting rotary motion to said platen;

wherein when said platen is rotated, said bowl orbits around said first axis and said fixed drive gear rotates said planetary gear around said second axis.

8. An apparatus according to claim 1 wherein said electrolytic cell further comprises a dome assembly disposed upon said bowl, said dome assembly comprising:

a dome wall having a lower rim flange connectable to said bowl and an annular top rim defining a port; and

a helical auger flange on the inside of said dome wall and spiraling from about said rim flange to about said to rim;

wherein when said electrolytic cell is rotated in one direction about said second axis, the substrate material is urged downward by said auger flange, and when said electrolytic cell is rotated in a second direction, the substrate material is augered upward toward said port.

9. A rotary flow-through electrodeposition apparatus comprising:

a platen rotatable about a first axis;

an electrolytic cell rotatably mounted upon said platen and rotatable about a second axis, said second axis being offset from and parallel to said first axis;

5 an electrode assembly disposable into said electrolytic cell; and

means for imparting rotary motion, around said second axis, to said electrolytic cell by rotating said platen;

wherein when said platen is rotated and said electrolytic cell is rotated, said electrolytic cell undergoes planetary revolution with respect to said first axis.

10. An apparatus according to claim 9 wherein said platen is rotatably mounted upon a fixed supporting shaft, and said means for imparting rotary motion comprises:

a drive gear fixed upon said shaft concentrically with said platen;

a planetary gear fixedly mounted upon said bowl and engaged with said drive

15 gear; and

means for imparting rotary motion to said platen;

wherein when said platen is rotated, said bowl orbits around said first axis and said fixed drive gear rotates said planetary gear around said second axis.

11. An apparatus according to claim 10 wherein said electrolytic cell comprises a bowl assembly, said bowl assembly comprising:

a bowl for containing a substrate material and electrolytic solution;

a plurality of electrodes arranged in a radial array radiating outwardly from said

second axis;

means for serially applying electrical potential sequentially to said electrodes

while said electrolytic cell rotates.

12. An apparatus according to claim 11 wherein electrical potential is applied sequentially to individual ones of said electrodes.

13. An apparatus according to claim 11 wherein electrical potential is applied sequentially to interconnected groups of said electrodes.

14. An apparatus according to claim 11 wherein said plurality of electrodes are electrically isolated in said bowl to have inside faces exposed to the interior of said bowl and contact portions exposed at an undersurface of said bowl, and said means for serially applying electrical potential comprises a wire wheel electrical contact disposed upon said platen in rolling contact with the underside of said bowl and intermittently contactable with said contact portions of said electrodes as said electrolytic cell rotates.

15. An apparatus according to claim 14 wherein said wire wheel contact and said second axis are fixed to be collinear on a common radius of said platen while said platen rotates.

16. An apparatus according to claim 15 wherein the planetary revolution of said electrolytic cell, with respect to said first axis, urges the substrate matter to collect by centrifugal force at the portion of said bowl maximally distanced from said first axis, while the rotation of said electrolytic cell about said second axis causes the substrate material to tumble and agitate at said portion of said bowl.

17. An apparatus according to claim 16 wherein said electrolytic cell further comprises a dome assembly disposed upon said bowl, said dome assembly comprising:

a dome wall having a lower rim flange connectable to said bowl and an annular top rim defining a port; and

a helical auger flange on the inside of said dome wall and spiraling from about said rim flange to about said top rim;

wherein when said electrolytic cell is rotated in one direction about said second axis, the substrate material is urged downward by said auger flange, and when said electrolytic cell is rotated in a second direction, the substrate material is augered upward toward said port.

18. A rotary flow-through electrodeposition apparatus comprising:

a platen rotatable about a first axis;

an electrolytic cell rotatably mounted upon said platen and rotatable about a second axis, said second axis being offset from and parallel to said first axis; and

an electrode assembly disposable into said electrolytic cell;

wherein said electrolytic cell further comprises a dome assembly disposed upon said bowl, said dome assembly comprising:

a dome wall having a lower rim flange connectable to said bowl and an annular top rim defining a port; and

a helical auger flange on the inside of said dome wall and spiraling from about said rim flange to about said top rim;

and further wherein when said electrolytic cell is rotated in one direction about said second axis, the substrate material is urged downward by said auger flange, and when said electrolytic cell is rotated in a second direction, the substrate material is augered upward toward said port.

wherein when said platen is rotated and said electrolytic cell is rotated, said electrolytic cell undergoes planetary revolution with respect to said first axis.

19. An apparatus according to claim 18 wherein said electrolytic cell comprises a bowl assembly, said bowl assembly comprising:

a bowl for containing a substrate material and electrolytic solution;

a plurality of electrodes arranged in a radial array radiating outwardly from said

second axis;

means for serially applying electrical potential sequentially to said electrodes while said electrolytic cell rotates.

5 20. An apparatus according to claim 19 wherein said plurality of electrodes are electrically isolated in said bowl to have inside faces exposed to the interior of said bowl and contact portions exposed at an undersurface of said bowl, and said means for serially applying electrical potential comprises a wire wheel electrical contact disposed upon said platen in rolling contact with the underside of said bowl and intermittently contactable with said contact portions of said electrodes as said electrolytic cell rotates.

 21. An apparatus according to claim 20 wherein said wire wheel contact and said second axis are fixed to be collinear on a common radius of said platen while said platen rotates.

15 22. An apparatus according to claim 21 wherein the planetary revolution of said electrolytic cell, with respect to said first axis, urges the substrate matter to collect by centrifugal force at the portion of said bowl maximally distanced from said first axis, while the rotation of said electrolytic cell about said second axis causes the substrate material to tumble and agitate at said portion of said bowl.

20 23. An apparatus according to claim 18 further comprising means for imparting rotary motion, around said second axis, to said electrolytic cell by rotating said platen.

24. An apparatus according to claim 23 wherein said platen is rotatably mounted upon
5 a fixed supporting shaft, and said means for imparting rotary motion comprises:

a drive gear fixed upon said shaft concentrically with said platen;

a planetary gear fixedly mounted upon said bowl and engaged with said drive
gear; and

means for imparting rotary motion to said platen;

wherein when said platen is rotated, said bowl orbits around said first axis and said fixed drive
gear rotates said planetary gear around said second axis.